

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
PHYSICS
PAPER 5 Practical Test
OCTOBER/NOVEMBER SESSION 2001

0625/5

1 hour 15 minutes

Candidates answer on the enclosed answer booklet.

Additional materials:

As listed in Instructions to Supervisors

TIME 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces provided on the answer booklet.

Answer **all** questions.

Write your answers in the spaces provided on the answer booklet.

You are expected to record all your observations as soon as these observations are made. These observations and any arithmetical working of the answers from them should be written in the answer booklet; scrap paper should **not** be used.

An account of the method of carrying out the experiments is **not** required but you should record any precautions you take, and it must be clear (by diagrams or otherwise) how the readings were obtained. The theory of the experiments is **not** required.

At the end of the examination, hand in only the answer booklet.

INFORMATION FOR CANDIDATES

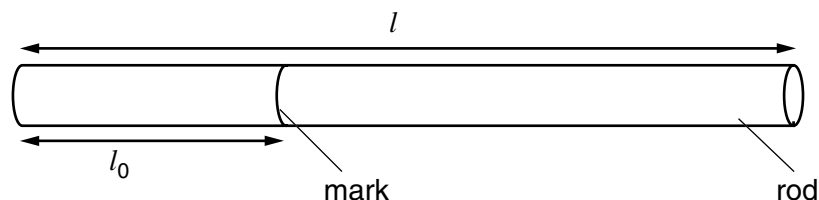
Graph paper is provided in the enclosed answer booklet. Additional sheets of graph paper should be used only if it is necessary to do so.

**This question paper consists of 7 printed pages, 1 blank page
and an inserted answer booklet.**

Question 1

In this experiment you are to determine the volume of a rod by two methods.

Record all of your observations and answers on page 2 of the Answer Booklet.

METHOD 1**Fig. 1.1**

Carry out the following instructions referring to Fig. 1.1.

- (a) Measure and record l , the length of the rod.
- (b) Measure and record l_0 , the distance between the mark on the rod and the end of the rod nearer to the mark.
- (c) Record S , the volume of water in the measuring cylinder.
- (d) Push the end of the rod nearer to the mark into the water in the measuring cylinder until the mark on the rod is level with the surface of the water.
- (e) Record T , the new water level reading on the measuring cylinder.
- (f) Calculate V_0 , the volume of the rod between the mark and the end of the rod nearer the mark. Show your working clearly.
- (g) Calculate V , the volume of the rod, using the equation below.

$$V = V_0 \times \frac{l}{l_0}$$

METHOD 2

- (a) Using the string provided and the metre rule, determine **as accurately as possible** c , the circumference of the rod. Record your working and answer.
- (b) Record l , the length of the rod, as already measured for method 1.
- (c) Calculate V , the volume of the rod, using the equation below.

$$V = 0.08 \times l \times c^2$$

Question 2

In this experiment, you are to determine the resistances of lamps.

Record all of your observations and answers on page 3 of your Answer Booklet.

Carry out the following instructions, referring to Fig. 2.1 and Fig. 2.2.

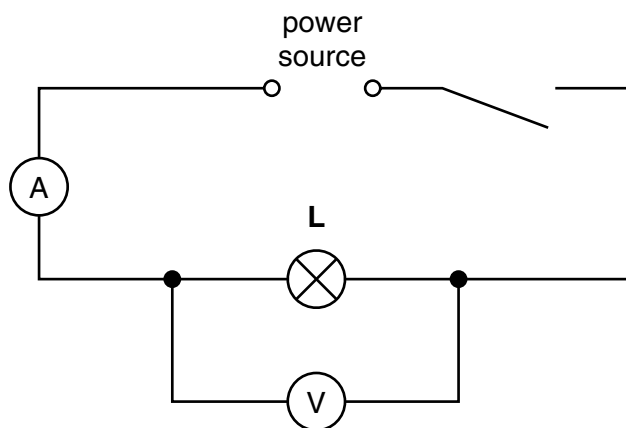


Fig. 2.1

The circuit shown in Fig. 2.1 has been set up for you.

- (a) Switch on. Measure and record in the table the current I through the lamp and the p.d. V across the lamp. Switch off.
- (b) Calculate the resistance R of the lamp using the equation below.

$$R = V/I$$

Record this value of R in the table.

Complete the column headings by inserting the appropriate unit for each of the I , V and R columns of the table.

- (c) Replace lamp **L** with lamp **M**. Repeat the procedure in sections (a) and (b), recording the corresponding values of I , V and R in the table.
- (d) Replace lamp **M** with lamp **N**. Repeat the procedure in sections (a) and (b), recording the corresponding values of I , V and R in the table.

- (e) Set up the circuit as shown in Fig. 2.2.

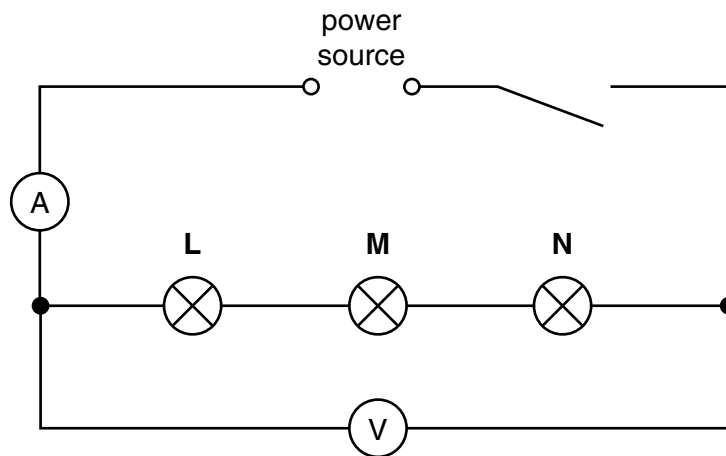


Fig. 2.2

- (f) Switch on. Measure and record in the table the meter readings. Switch off.
- (g) Calculate R , the combined resistance of the three lamps when connected in series using the equation below.

$$R = V/I$$

Record this value of R in the table.

- (h) Draw a circuit diagram showing
- the three lamps in parallel,
 - the voltmeter connected to measure the voltage across the lamps,
 - the ammeter connected to measure the current passing through lamp **M** only.

You are not asked to set up this circuit.

Question 3

In this experiment, you are to determine a quantity called the refractive index of the material of a transparent block.

Record all of your observations and answers on page 4 of the Answer Booklet.

Carry out the following instructions referring to Fig. 3.1.

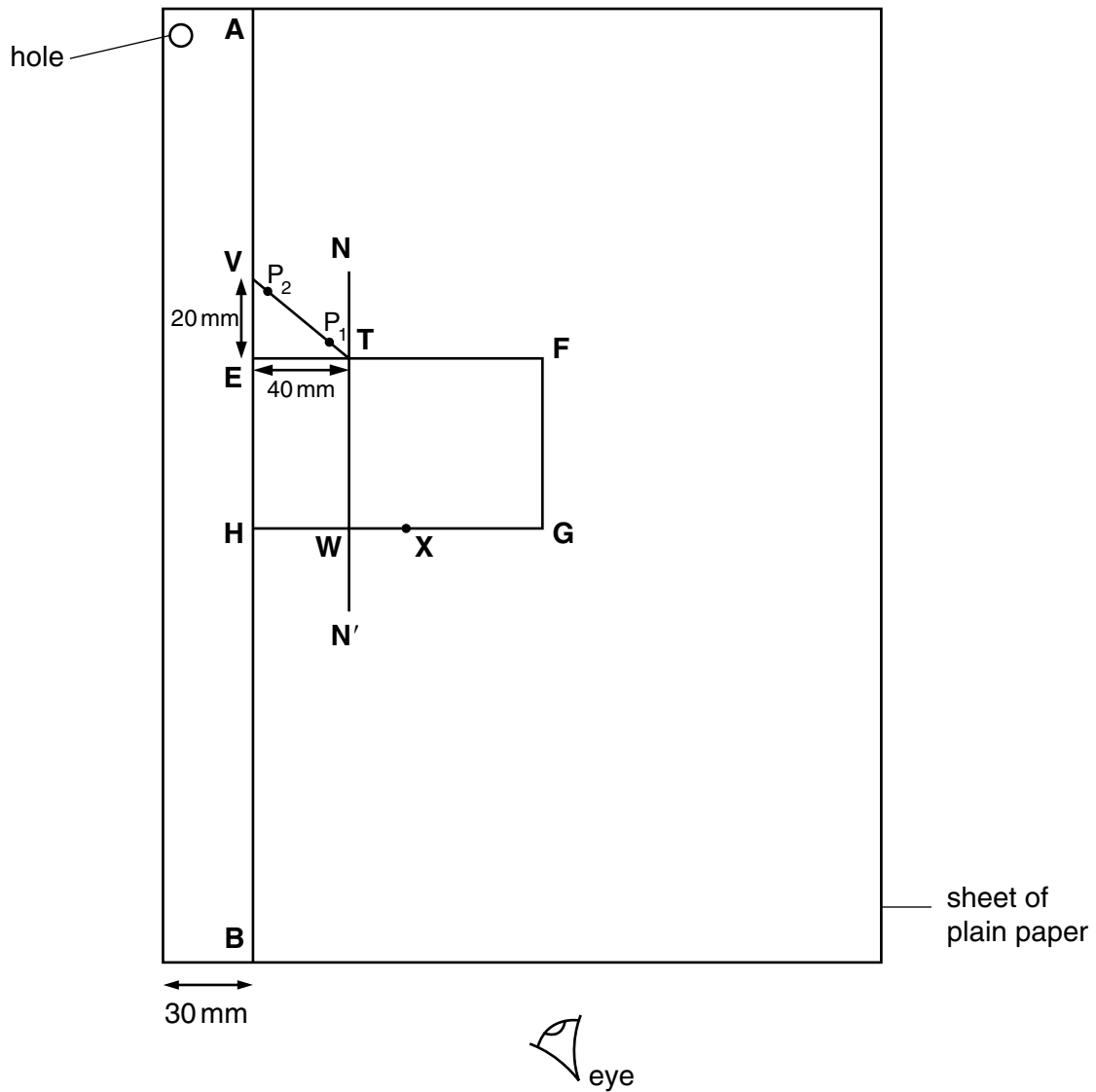


Fig. 3.1

- (a) Draw a line on the sheet of plain paper parallel to and 30 mm from one of the longer edges. Label this line **AB**.
 - (b) Place the transparent block, largest face down, on the paper with one of the shorter sides, **EH**, along the line **AB** and such that the distances **EA** and **HB** are approximately equal. Draw the outline of the block **EFGH**.
 - (c) Remove the block and draw the normal **NN'** to side **EF** so that the normal cuts **EF** at a point **T**, 40 mm from **E**. Continue the normal so that it cuts the line **HG** at a point **W**. Label this point.
 - (d) Mark a point **V** on **AB** such that **VE** is 20 mm. Draw in the line **VT**.
 - (e) Place the paper on the pin board.
 - (f) Place two pins **P₁** and **P₂** on line **VT**, as shown in Fig. 3.1.
 - (g) Replace the block and observe the images of **P₁** and **P₂** through side **GH** of the block so that the images of **P₁** and **P₂** appear one behind the other. Place two pins **P₃** and **P₄** between your eye and the block so that **P₃** and **P₄** and the images of **P₁** and **P₂**, **seen through the block** appear one behind the other. Mark the positions of **P₁**, **P₂**, **P₃** and **P₄**. Remove the block.
 - (h) Draw a line joining the positions of **P₃** and **P₄**. Continue the line until it meets **GH**. Label this point **X**.
 - (i) Draw the line **XT**.
 - (j) Measure and record the lengths **ET** = *a*, **VT** = *b*, **WX** = *c* and **XT** = *d*.
 - (k) Calculate *n*, the refractive index of the material of the block, using the equation below.
- $$n = \frac{a \times d}{b \times c}$$
- (l) State and explain the reason for **one** precaution that you took to gain an accurate result.

Tie your ray trace sheet into your Answer Booklet opposite page 4.

Question 4

In this experiment, you are to investigate the cooling of thermometer bulbs under different conditions.

Record all of your observations and answers on pages 6 and 7 of your Answer Booklet.

Carry out the following instructions referring to Fig. 4.1.

You are provided with two thermometers, **A** and **B**. Thermometer **B** has cotton wool wrapped around the bulb. Do **not** remove this cotton wool.

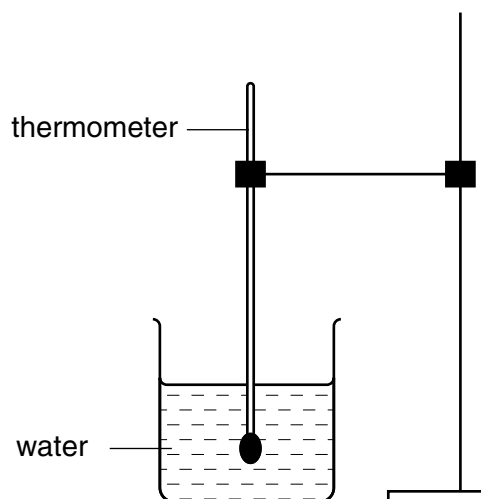


Fig. 4.1

- (a) Place thermometer **A** in the beaker of water. Measure θ , the temperature of the water. Record θ in the table provided at time $t = 0$ s.
- (b) Remove the thermometer from the water, starting the stopclock as you do so. Record in the table the temperature of the thermometer bulb at 30 s intervals until you have a total of six values. Complete the table by inserting the appropriate unit in each of the time and temperature column headings.
- (c) Repeat steps (a) and (b) using thermometer **B**.
- (d) Using the readings obtained for thermometer **A** plot a graph of $\theta/^\circ\text{C}$ (y -axis) against t/s (x -axis). Label the line '**A**'.
- (e) Using the same axes, plot the readings obtained for thermometer **B**. Label the line '**B**'.
- (f) State which thermometer cooled more quickly. Justify your answer by reference to your graph.